Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Nurse Education in Practice 46 (2020) 102807

Contents lists available at ScienceDirect

Nurse Education in Practice

journal homepage: www.elsevier.com/locate/nepr

Guest Editorial

COVID 19: Disruptive impacts and transformative opportunities in undergraduate nurse education

The COVID-19 pandemic and social distancing measures to mitigate its spread have provoked widespread societal disruption with recursive impacts within higher educational institutions and practice learning environments readily apparent. The forced rapid closure of face to face teaching has catapulted academic staff and students into what is for many, unfamiliar terrain. Challenges in managing such rapid change in educational provision have been influenced by prevailing institutional attitudes towards e-learning and pedagogy, existing IT infrastructure, availability of learning technology support, staff digital literacy and redeployment of clinical academics. Similarly, students have been compelled to adapt to a wholesale shift to on-line educational delivery. Some students will readily embrace this shift to e-learning, valuing its flexibility in geographical location and time, whereas others will experience discomfort because of their limited digital literacy or absence of physical human engagement and camaraderie.

Likewise, rapid change has occurred within practice learning. In the UK, new emergency standards for pre-registration nursing have been introduced enabling student nurses to voluntarily opt-in to paid extended clinical placements (Nursing and Midwifery Council, 2020). Whilst giving some students a sense of achievement by *'making a difference'* and contributing to the greater good, feelings of impotence in students unable to do so cannot be understated, with current media *'hero'* bombardment potentially generating feelings of guilt and distress. Moreover, ambiguity surrounding these new roles risks placing limits on learning opportunities, most significantly for final year students who must consolidate the necessary skills and competencies to enable safe transition to registration. Similar 'innovations' have been mooted in Australia, but the largest impact has been via clinical placements (particularly in the private and aged care sectors) being cancelled. Likewise, the USA has faced a reduction in clinical placement availability. Consequent challenges in meeting the necessary national requirements for clinical experiences (National Council for State Boards of Nursing, 2020) have meant that many states have pushed through legislation to enable virtual simulation to account for clinical hours (American Association of Colleges of Nursing, 2020). Such disruption to nursing programmes will likely provoke a wide array of uncertainties for students generating emotional distress. This will undoubtedly contribute to more obvious sources of distress such as fears of contracting COVID and moral distress consequent on encountering death at scale. Pervasive uncertainties about course progression and completion will undoubtedly underpin all student experience in the months if not years ahead.

COVID 19's disruptive impacts have necessitated rapid change in clinical practice, for example the use of video consultations in the UK has now occurred at speed and scale contrasting with almost glacial implementation during the pre-COVID era (Thornton, 2020). Thus, disruption has created fertile opportunity for transformation. The immediate response of many higher education institutional providers has been to replicate traditional classroom activities such as face to face didactic teaching with synchronous on-line lectures or asynchronous lecture capture or podcasts. Whilst understandably necessary in the short term to prevent interruption to students' learning, we must critically question whether short term replication will suffice or whether transformative opportunities should be seized.

Undergraduate nursing has seen an incremental shift towards e-learning providing a flexible student-centred model of learning contrasting with didactic transmission models of education (Betihavas et al., 2016). Whilst the evidence base is immature, recent systematic reviews indicate that e-learning produces neutral or positive academic outcomes in undergraduate nurse and health professional education (Betihavas et al., 2016; Hew and Lo, 2018). However, mitigating recognised barriers to e-learning is necessary to ensure effective student learning. Regmi and Jones' (2020) timely systematic review presents a new conceptual framework of factors influencing the uptake of e-learning in health sciences education. Importantly they identified: isolation; learning space; course structure; poor institutional design; time; cost; and labour; as the most frequently reported barriers. The interdependent nature of these barriers thus necessitates a 'systems thinking' approach to institutional implementation of e-learning. For example, determining the optimum balance of individual student-centred learning versus collaborative learning (synchronous or asynchronous) to promote student peer-engagement, the latter fostering a virtual community of practice to mitigate isolation. Such deliberations will inevitably impact on course structure. Alternatively, addressing equity of learning space in terms of access to physical IT infrastructure, bandwidth and digital literacy will have likely cost implications; institutions will need to ensure sufficient resources to ensure that students from lower-socioeconomic backgrounds are not disadvantaged and that equity in student experience is guaranteed. In societies with a heavy reliance on attracting international students into nursing courses to maintain intake levels, such as Australia, the issue of such students' readiness and ability to function effectively online is also of concern. This is complicated further by immigration controls over international students 'attending' online classes only (i.e. It is proscribed). Institutions embracing e-learning during COVID and beyond must be cognisant of these potential barriers and more, to achieve successful transformation.

Models of undergraduate student nursing are often predicated on *serial* delivery of theory and clinical practice blocks. However, embracing e-learning and freeing students from the geographical and time constraints of traditional face to face teaching could instead facilitate *parallel* delivery of theory and practice (something which already happens in many Australian nursing schools, due to the availability [or

https://doi.org/10.1016/j.nepr.2020.102807
Received 15 May 2020; Accepted 26 May 2020
Available online 28 May 2020

otherwise] of suitable clinical placements). Such parallel delivery could (and can) proffer several advantages by countering concerns of prolonged student isolation from social distancing; facilitating synchronous application of taught e-clinical skills within the practice learning environment; and increasing timetabling flexibility. This is particularly the case if the alternative is for classes to be taught several times over, in any one semester or year.

Concomitant to change in pedagogy and modes of educational delivery, COVID-19 will indelibly transform the content of curriculums. Both students and educators are cognisant of pressing need to understand evolving knowledge of SARS-CO V, COVID-19 and the nursing care of patients and their families. It is far from unimaginable, that another such virus or other health emergency will not emerge at some time in the future. The content of curriculums must assimilate new knowledge (or perhaps revisit that which has now been expunged) in epidemiology, public health and health promotion (including hygiene imperatives such as hand washing, and principles of infection control). There may also be a need for more advanced understandings of intensive care nursing and supportive care for patients who experience abrupt transitions to end of life care, and a greater appreciation of ethical complexities posed by events such as the COVID19 pandemic; amongst nurses generally and in pre-registration curriculum. In tandem, educators must work ever-harder to embed strategies which support student well-being and foster emotional resilience, into their curriculums.

Practice learning has already swiftly adapted to COVID-19. Taken for granted practices such as the habits of wearing uniform to a shift, working, then going home again in that uniform, have been correctly identified as an infection control risk. However, this is exacerbated by the lack of hospital laundry services, staff and students providing their own uniforms and a lack of staff changing room facilities. This surely must be attended to by service providers. Conversely, negotiating interpersonal communication and establishing therapeutic relationships with frightened patients through layers of PPE together with breaking bad news via telephone to families remote from their loved ones present hitherto unknown challenges for even the most experienced practitioners. Supporting students who are working in practice, to cope with these evolving practices signals the need for regular clinical supervision and pastoral support from academic staff.

Successful innovation and transformation are predicated on sustainability, spread and scale. Greenhalgh and Papoutsi (2019) argue that while PDSA models are appropriate for small scale innovation, spreading and scaling up major innovations necessitates a complex systems approach which is ecological rather than mechanical (p. 2). They assert that successful learning systems require attributes such as a participatory culture, distributed leadership, engaged participants, shared and evidence-based decision making and transparent assessment of outcomes (p. 3). Greenhalgh and Papoutsi (2019) propose several specific research methodologies informed by complexity science. Of these, participant experience based co-design projects, might proffer advantage given their use in educational innovation within nursing (Munoz et al., 2017). Any intended outcomes measures must be clearly aligned with potential impacts with research designs suitably flexible to capture and measure intended **and** unintended impacts.

To promote transformation, such participatory cultures must extend beyond individual Higher Educational Institutions to encompass wider communities of nurse education, including local and national clinical practice partners. Pooling of digital and practice learning educational resources would enhance the quality of learning materials and negate replication and redundancy within educational systems. Doing so would free up academic and practice educators time to engage students in small group and problem-based learning to facilitate knowledge translation and foster deeper learning. Such approaches could be accommodated within virtual learning environments in a variety of formats such as synchronous virtual classrooms, discussion board forums etc. or within small face to face groups where the requirements of social distancing can be readily achieved. However, such participatory practices will require leadership, transparency, and collegiate collaboration.

Taken together the disruptive impacts of COVID-19 present an unprecedented opportunity for transformation within undergraduate nurse education. Rapid dissemination of innovation to facilitate evidenced base nurse education and new understandings to support clinical nursing practice during COVID-19 and beyond is imperative. This will require ethical boards and nursing journals to rapidly flex to ensure timely approvals and rapid publication whilst maintaining high standards of rigorous research. As nurse educators and researchers must move forward with our students and clinical partners and to support, evaluate and propagate this transformation.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.nepr.2020.102807.

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